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BACTERIOLOGICAL ETIOLOGY OF EAR INFECTION AND THEIR ANTIBACTERIAL SUSCEPTIBILITY PATTERN AT A TERTIARY CARE CENTRE IN NORTHEN INDIA

Medical Microbiology

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ABSTRACT

Objective: This study aimed to evaluate the Bacteriological etiology and AST pattern of ear infection at a tertiary care hospital. **Methods:** We collected retrospective data from bacteriological results of ear discharge samples from september 2021 to september 2023. Collect relevant details from medical records, such as clinical data, antibiotic susceptibility profiles, microbiological test findings, and patient demographics. **Results:** A total of 216 Ear infections cases were included in the study. One hundred eleven 51% patients were females and one hundred five 49% were males. The most common bacterial species isolated were S. aureus (32.8%) followed by coagulase-negative staphylococcus (CONS) (23.1%), Pseudomonas aeruginosa (10.6%), Pseudomonas other species (8.7%), Klebsiella pneumoniae (8.3%), E coli (5.5%), Methicillin-resistant S aureus (MRSA) (3.7%), Proteus mirabilis (2.7%), Proteus other species (2.7%), and Klebsiella other species (1.3%). Most of the S. aureus isolates were susceptible to vancomycin (98.2%) and Teicoplanin (96.8%). CONS organisms were susceptible in highest percentage to Vancomycin and Tobramycin 100%. Gram negative organisms Pseudomonas aeruginosa isolates were highly susceptible to Norfloxacin 100% and doripenem 95.2%. **Conclusion:** Overall, our study highlights the prevalence of gram-positive and gram-negative bacterial strains causing ear infections, emphasizing the need for tailored empirical therapy protocols informed by antibiotic sensitivity profiles, to optimize treatment outcomes and enhance patient care in our region.

KEYWORDS

Ear Infection, Antibiotic Susceptibility, Bacterial Infection.

INTRODUCTION

Ear infections occur when fluid and pathogens, such as bacteria or viruses, become trapped in the ear, leading to inflammation. While ear infections can affect individuals of any age, they are particularly common in children. The ear is divided into three main sections, the outer ear, middle ear, and inner ear Otitis media, an infection in the middle ear, is indeed the most common type of ear infection.[3] Colds, sinus infections, and allergies frequently contribute to ear infections, resulting in symptoms such as ear pain, fever, diminished hearing, and discharge resembling pus. Although the immune system of the body can frequently treat ear infections on its own, in some situations antibiotics and other drugs are required to treat the infection and reduce symptoms.[4]

Ear infection results in ear inflammation, with ear discharge being one of the most prevalent signs.[5] Approximately 330 million people worldwide are affected by ear infections, and 60% of them have significant hearing loss. The Pacific Islands are considered to have among of the highest rates of ear infections and hearing loss in the world, according to the World Health Organization.[6] In children more specifically, vaccine-preventable illnesses and middle ear infections are substantial contributors to preventable hearing loss.[7] A public health approach to lowering the incidence of ear illness and hearing loss is suggested given the lack of ear and hearing health services in that region. To succeed in achieving this goal, interaction with health promotion services is necessary.[8,9,10] It is estimated that 80% of youngsters will at some stage in their adulthood develop otitis media.[11,12] As the eustachian canal is shorter and more horizontal in children than that in adults, children have a higher frequency of ear infections than adults.[13] Acute suppurative otitis media. Chronic suppurative otitis media (CSOM, persistent purulent discharge that lasts for more than 2 weeks). Non-suppurative otitis media including acute and chronic NSOM. Bacteria are the leading pathogens of ear infection, whereby, *Staphylococcus aureus, Pseudomonas aeruginosa, Proteus mirabilis* and *Klebsiella species* are the dominant bacteria causing ear infection globally.[14,15,16,17,18,19] In addition, *Candida species* and *Aspergillus species* are predominant fungal isolates responsible for ear infection.[20,21,22,23] Higher rates of hearing loss can be brought on by persistent infections or harm to the inside parts of your ear. Spread of the infection: Untreated infections or infections that do not improve on their own can spread. Infection can spread to the bone behind your ear.

MATERIAL AND METHODS

Study Design and Period

A hospital-based retrospective study has been conducted between September 2021 to September 2023 at the Department of Microbiology IIMSR, Integral University Lucknow.

Data Collection

We did retrospective review of two-year laboratory records of all ear swab or ear pus taken from patients suspected of having ear infection presenting to IIMSR, Integral University Lucknow. We Collected relevant data from medical records, including patient demographics, clinical information, microbiological test results, and antibiotic susceptibility profiles.

Laboratory Method

Ear discharge was collected under a strict aseptic technique using a sterile cotton swab from each patient. Within 2 hrs of collection, swabs were transported to the microbiology laboratory of IIMSR for culture and AST. The specimens were directly inoculated on Blood agar, Chocolate agar, and MacConkey agar.

Chocolate agar (CA) was used to isolate fastidious bacteria, such as *Haemophilus influenzae* and *Streptococcus pneumoniae*, the frequent etiological agents of ear infection. MacConkey agar (MCA) was used as a selective and differential medium for Gram- negative bacteria and Blood agar (BA) was used as a general- purpose medium.

MacConkey and Blood agar plates were incubated in aerobic conditions and Chocolate agar plates in a candle jar. All the inoculated media were incubated at 37°C for 18–24 hr. Bacterial isolates were identified by interpreting colonial morphologies, microscopic examination (Gram stain) and biochemical tests. The catalase and coagulase tests were performed for Gram- positive bacteria**,** Kligler's iron agar, sulfur indole motility, citrate and urease tests were performed for gram- negative bacteria.

Antimicrobial susceptibility testing

Antibiotic susceptibility testing was carried out using Kirby-Bauer Disc-diffusion technique[24] on Muller Hinton agar following the CLSI guidelines (2012–2017). The bacterial suspension was standardized using 0.5 McFarland standard and inoculated on Mueller–Hinton agar. The antibiotic discs were dispensed after drying the plate for 3–5 min and incubated at 37°C for 24 hrs. Penicillin G (10IU), Cefoxitin (30µg), Ampicillin (10µg), Amoxicillin (10µg), Erythromycin (15µg), Clindamycin (2µg), Cotrimoxazole (25µg), Oxacillin (1µg), Co-amoxiclav (20/10µg), Cefuroxime (30µg), Ceftriaxone (30µg), Gentamicin (10µg), Tobramycin (10µg), Ciprofloxacin (5µg), Norfloxacin (10µg), Meropenem (10µg), Tetracycline (30µg), Nalidixic acid (30µg), Vancomycin (30µg), Amikacin (30µg), and Chloramphenicol (30µg) were used to test the susceptibility of bacterial isolates. The control strains *S. aureus* (ATCC 25923), *E. coli* (ATCC 25922), and *P. aeruginosa* (ATCC 27853) were used for quality control.[25]

Data analysis and Interpretation

The data has been analyzed using SPSS software and Microsoft Excel, and the results will be presented in numbers and percentages through tables. Tests of significance, such as T-tests, will be applied to determine the results.

RESULTS

A total of 216 Ear infections cases were included in the study. One hundred eleven (51%) (n= 111) patients were female and one hundred five 49% (n = 105) were male.

The predominant bacterial species isolated were *Staphylococcus aureus* (32.8%) followed by *CONS* (23.1%), *Pseudomonas aeruginosa* (10.6%), *Pseudomonas other Species* (8.7%), *Klebsiella Pneumoniae* (8.3%), *E. COLI* (5.5%), *MRSA* (3.7%), *Proteus Mirabilis* (2.7%), *Proteus other Species* (2.7%), *Klebsiella other species* (1.3%).

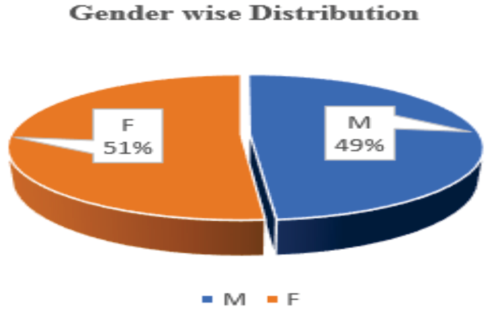

Table 1: Distribution Of Patients According To Age Groups.

AGE GROUP (IN YEAR)	FREQUENCY	PERCENTAGE %
0 -10	12	5.5%
11 20	61	28.2%
21 -30	67	31.0%
31 -40	28	12.9%
41 -50	25	11.5%
51-60	13	6.0%
> 60	10	4.6%
TOTAL	216	100%

During the study, it was observed that the maximum number of patients were belong to the age group 21-30 year 31%, followed by 28.2% patients who belong to the age group of 11-20 years, 12.9% patients who belong to the age group of 31-40 years, 11.5% of patients from the age group of 41-50 years, 6% patients from the age group of 51-60 years, 5.5% patients who belong to the age group of 0–10 years. It also includes the patients of age group >60 years 4.6%.

Table 2: Distribution Of Bacterial Profiles Of Ear Infections.

ORGANISM	FREQUENCY	PERCENTAGE%
Staphylococcus aureus	71	32.8%
CONS	50	23.1%
MRSA	8	3.7%
E. COLI	12	5.5%
Pseudomonas aeruginosa	23	10.6%
Proteus Mirabilis	6	2.7%
Klebsiella Pneumoniae	18	8.3%
Pseudomonas Species	19	8.7%
PROTEUS Species	6	2.7%
Klebsiella species	3	1.3%
TOTAL	216	100%

This table show that, the isolates included both gram positive and gram negative organisms. Out of the 216 isolates, gram positive bacteria accounts for 129 (59.72%) while the gram negative bacteria accounts for 87 (40.27%). The predominant bacterial species isolated were *Staphylococcus aureus* (32.8%).

Table 3: Distribution Of Year Wise Isolates Among Ear Infections

ORGANISM	SEP-DEC 2021	JAN-DEC 2022	JAN-SEP 2023	MALE	FEMALE	ALL YEAR TOTAL	ALL YEAR TOTAL PERCENTAGE%
Staphylococcus aureus	14	38	19	35	36	71	32.87%
CONS	13	27	10	21	29	50	23.14%
MRSA	0	7	1	4	4	8	3.70%
E. COLI	8	4	0	5	7	12	5.55%
Pseudomonas aeruginosa	4	16	3	13	10	23	10.64%
Proteus Mirabilis	2	4	0	3	3	6	2.77%
Klebsiella Pneumoniae	6	8	4	9	9	18	8.33%
Pseudomonas Species	8	6	5	8	11	19	8.79%
PROTEUS Species	0	5	1	4	2	6	2.77%
Klebsiella species	2	0	1	3	0	3	1.38%
TOTAL	57	115	44	105	111	216	100%

Out of 216 isolates,

- 57 (26.3%) were isolated in SEP-DEC 2021
- 115 (53.2%) were isolated in January–December 2022.
- and 44 (20.3%) isolates in January–Sep 2023

Table 4: Antibacterial Sensitivity Of *Staphylococcus Aureus* In Ear Infections.

Antibiotics	Sensitive	Resistant	Intermediate	Total	Percentage of sensitive strains (%)
Cefoxitin (CX)	37	29	0	66	56.0%
Erythromycin (E)	31	29	6	66	46.9%
Clindamycin (CD)	50	15	0	65	76.9%
Tetracycline (TE)	39	18	1	58	67.2%
Doxycycline (DO)	33	3	1	37	89.1%
Vancomycin (VA)	55	1	0	56	98.2%
Teicoplanin (TEI)	62	2	0	64	96.8%
Linezolid (LZ)	58	5	0	63	92.0%
Ciprofloxacin (CIP)	4	63	0	67	5.9%
Levofloxacin (LEVO)	5	64	1	70	7.1%
Gentamicin (GEN)	43	17	5	65	66.1%
Amikacin (AK)	18	45	0	63	28.5%
Tobramycin (TOB)	32	3	0	35	91.4%

The most sensitive drugs of *staphylococcus aureus* are as follows: Vancomycin 98.2%, Teicoplanin 96.8%, Linezolid 92%, Tobramycin 91.4%, Doxycycline 89.1%. Other antibiotics with less than 80% sensitivity are Clindamycin, Tetracycline, Gentamicin, Cefoxitin, Erythromycin, Amikacin, Levofloxacin, Ciprofloxacin.

Table 5: Antibacterial Sensitivity Of *Cons* In Ear Infections.

Antibiotics	Sensitive	Resistant	Intermediate	Total	Percentage of sensitive strains (%)
Cefoxitin (CX)	12	3	0	15	80%
Erythromycin (E)	5	9	0	14	35.7%
Clindamycin (CD)	9	5	0	14	64.2%
Tetracycline (TE)	10	3	0	13	76.9%
Doxycycline (DO)	8	2	1	11	72.7%
Vancomycin (VA)	13	0	0	13	100%

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Teicoplanin (TEI)	14	1	0	15	93.3%
Linezolid (LZ)	13	1	1	15	86.6%
Ciprofloxacin (CIP)	4	9	0	13	30.7%
Levofloxacin (LEVO)	8	7	0	15	53.3%
Gentamicin (GEN)	14	1	0	15	93.3%
Amikacin (AK)	15	32	0	47	31.9%
Tobramycin (TOB)	21	0	0	21	100%

The most sensitive drugs of *CONS* are as follows: Vancomycin 100%, Tobramycin 100%, Teicoplanin 93.3%, Gentamicin 93.3%, Linezolid 86.6%, Cefoxitin 80%.

Other drugs which less than 80% sensitivity are Tetracycline, Doxycycline, Clindamycin, Levofloxacin, Erythromycin, Amikacin, Ciprofloxacin.

Table 6: Antibacterial Sensitivity Of *E Coli.* In Ear Infections.

Antibiotics	Sensitive	Resistant	Inter mediate	Total	Percentage of sensitive strains (%)
Ampicillin/ sulbactam(A/S)	5	7	0	12	41.6%
Piperacillin/Tazobactam (PIT)	7	5	0	12	58.3%
Tetracycline (TET)	7	3	0	10	70%
Gentamicin (GEN)	5	6	1	12	41.6%
Amikacin (AK)	9	3	0	12	75%
Tobramycin (TOB)	5	7	0	12	41.6%
Ceftriaxone (CTR)	4	7	1	12	33.3%
Ceftazidime (CAZ)	6	6	0	12	50%
Ceftazidime/clavulanic acid (CAC)	5	2	1	8	62.%
Cefepime (CMP)	6	5	1	12	50%
Aztreonam (AT)	3	6	0	9	33.3%
Ciprofloxacin (CIP)	6	6	0	12	50%
Levofloxacin (LEVO)	6	6	0	12	50%
Imipenem (IPM)	7	5	0	12	58.3%
Doripenem (DOR)	9	3	0	12	75%
Meropenem (MRP)	8	4	0	12	66.6%
Tigecycline (TG)	8	3	0	11	72.7%
Cefazolin (CZ)	6	5	0	11	54.5%
Norfloxacin (NX)	5	0	0	5	100%
Nitrofurantoin (NIT)	5	0	0	5	100%

The most sensitive drugs of *E COLI* are as follows: Norfloxacin 100%, Nitrofurantoin 100%, Amikacin 75%, Doripenem 75%, Tigecycline 72.7%, Tetracycline 70%. Other drugs which less than 70% sensitivity are Meropenem, Ceftazidime/clavulanic acid, Piperacillin/ Tazobactam, Imipenem, Cefazolin, Ciprofloxacin, Ceftazidime, Levofloxacin, Cefepime, Ampicillin/ sulbactam, Gentamicin, Tobramycin, Aztreonam, Ceftriaxone.

Table 7: Antibacterial Sensitivity Of *Pseudomonas Aeruginosa* In Ear Infections.

Antibiotics	Sensitive	Resistant	Interme diate	Total	Percentage of sensitive strains (%)
GENTAMICIN	19	3	0	22	86.3%
AMIKACIN	18	4	0	22	81.8%
TOBRAMYCIN	17	3	1	21	80.9%
PIPERACILLIN	16	5	1	22	72.7%
PIPERACILLIN/ TAZOBACTAM	21	2	0	23	91.3%
TICARCILLIN/CLAVULANIC	13	4	5	22	59.%
CIPROFLOXACIN	16	4	0	20	80%
LEVOFLOXACIN	17	4	2	23	73.9%
CAEFTAZIDIME	18	4	0	22	81.8%
CEFTAZIDIME/CLAVULANIC ACID	5	3	1	9	55.5%
CEFEPIME	15	5	0	20	75%
AZTREONAM	17	3	2	22	77.2%
IMIPENEM	20	2	0	22	90.9%
MEROPENEM	19	2	0	21	90.4%
DORIPENEM	20	1	0	21	95.2%
POLYMIXIN	13	0	9	22	59.%
COLISTIN	12	9	0	21	57.%
NORFLOXACIN	5	0	0	5	100%

The most sensitive drugs of *pseudomonas aeruginosa* are as follows:

- Norfloxacin 100%
- doripenem 95.2%
- piperacillin/tazobactam 91.3%
- imipenem 90.9%
- meropenem 90.4%
- gentamicin 86.3%

Other drugs with less than 85% sensitivity are caeftazidime, amikacin, tobramycin, ciprofloxacin, aztreonam, cefepime, levofloxacin, piperacillin, polymixin, ticarcillin/clavulanic, colistin, ceftazidime/clavulanic acid.

Table 8: Antibacterial Sensitivity Of *Psedomonas* Other Species In Ear Infections:

Antibiotics	Sensitive	Resistant	Inter mediate	Total	Percentage of sensitive strains (%)
GENTAMICIN	13	6	0	19	68.4%
AMIKACIN	13	5	1	19	68.4%
TOBRAMYCIN	14	4	0	18	77.7%
PIPERACILLIN	14	5	0	19	73.6%
PIPERACILLIN/TAZOBACTAM	17	1	1	19	89.4%
TICARCILLIN/CLAVULANIC	13	5	1	19	68.4%
CIPROFLOXACIN	10	6	2	18	55.5%
LEVOFLOXACIN	10	9	0	19	52.6%
CAEFTAZIDIME	12	5	1	18	66.6%
CEFTAZIDIME/CLAVULANIC ACID	11	2	0	13	84.6%
CEFEPIME	12	7	0	19	63.1%
AZTREONAM	11	5	3	19	57.8%
IMIPENEM	15	3	1	19	78.9%
MEROPENEM	17	2	0	19	89.4%
DORIPENEM	17	2	0	19	89.4%
POLYMIXIN	14	5	0	19	73.6%
COLISTIN	14	5	0	19	73.6%
NORFLOXACIN	5	0	0	5	100%

The most sensitive drugs of *pseudomonas* other species are as follows: Norfloxacin 100%, doripenem 89.4%, meropenem 89.4%, piperacillin/tazobactam 89.4%, ceftazidime/clavulanic acid 84.6%, imipenem 78.9%. Other drugs with less than 78% sensitivity are tobramycin, colistin, polymixin, piperacillin, gentamicin, amikacin, ticarcillin/clavulanic, caeftazidime, cefepime, aztreonam, ciprofloxacin, levofloxacin.

Table 9: Antibacterial Sensitivity Of *Proteus* Species In Ear Infections.

Antibiotics	Sensitive	Resistant	Interme diate	Total	Percentage of sensitive strains (%)
Ampicillin/ sulbactam(A/S)	7	4	0	11	63.6%

Piperacillin/Tazobactam (PIT)	11	0	0	11	100%
Tetracycline (TET)	3	6	1	10	30%
Gentamicin (GEN)	10	0	1	11	90.9%
Amikacin (AK)	9	1	1	11	81.8%
Tobramycin (TOB)	8	2	1	11	72.7%
Ceftriaxone (CTR)	6	5	0	11	54.5%
Ceftazidime (CAZ)	7	2	0	9	77.7%
Ceftazidime/clavulanic acid (CAC)	8	0	0	8	100%
Cefepime (CMP)	7	2	0	9	77.7%
Aztreonam (AT)	5	1	0	6	83.3%
Ciprofloxacin (CIP)	9	2	0	11	81.8%
Levofloxacin (LEVO)	6	5	1	12	50%
Imipenem (IPM)	10	1	0	11	90.9%
Doripenem (DOR)	9	0	0	9	100%
Meropenem (MRP)	9	1	0	10	90%
Tigecycline (TG)	9	0	0	9	100%
Cefazolin (CZ)	7	1	0	8	87.5%
Norfloxacin (NX)	3	0	0	3	100%
Nitrofurantoin (NIT)	3	0	0	3	100%

The most sensitive drugs of *proteus mirabilis* and *proteus* other species are as follows: Norfloxacin 100%, Nitrofurantoin 100%, Ceftazidime/ clavulanic acid 100%, Tigecycline 100%, Piperacillin/Tazobactam 100%, Dorip enem 100%, Gentamicin 90.9%, Imipenem 90.9%, Meropenem 90%.

Other drugs which less than 90% sensitivity are Cefazolin Aztreonam, Ciprofloxacin, Amikacin, Cefepime, Ceftazidime, Tobramycin, Ampicillin/ sulbactam, Ceftriaxone, Levofloxacin, Tetracycline.

Table 10: Antibacterial Sensitivity Of *Klebsiella* Species In Ear Infections.

Antibiotics	Sensitive	Resistant	Intermediate	Total	Percentage of sensitive strains (%)
Ampicillin/ sulbactam(A/S)	6	12	3	21	28.5%
Piperacillin/Tazobactam (PIT)	12	6	3	21	57.1%
Tetracycline (TET)	13	6	2	21	61.9%
Gentamicin (GEN)	16	3	2	21	76.1%
Amikacin (AK)	16	3	1	20	80%
Tobramycin (TOB)	13	6	2	21	61.9%
Ceftriaxone (CTR)	12	9	0	21	57.1%
Ceftazidime (CAZ)	9	11	1	21	42.8%
Ceftazidime/clavulanic acid (CAC)	10	5	0	15	66.6%
Cefepime (CMP)	15	4	0	19	78.9%
Aztreonam (AT)	6	7	2	15	40%
Ciprofloxacin (CIP)	14	6	0	20	70%
Levofloxacin (LEVO)	13	8	0	21	61.9%
Imipenem (IPM)	14	6	1	21	66.6%
Doripenem (DOR)	18	2	1	21	85.7%
Meropenem (MRP)	15	3	1	19	78.9%
Tigecycline (TG)	16	4	0	20	80%
Cefazolin (CZ)	6	5	0	11	54.5%
Norfloxacin (NX)	3	0	0	3	100%
Nitrofurantoin (NIT)	3	1	0	4	75%

The most sensitive drugs of *Klebsiella pneumoniae* and *Klebsiella* other species are as follows: Norfloxacin 100%, Doripenem 85.7%, Tigecycline 80%, Amikacin 80%, Meropenem 78.9%, Cefepime 78.9%.

Other drugs which less than 78% sensitivity are Gentamicin, Nitrofurantoin, Ciprofloxacin, Imipenem, Ceftazidime/clavulanic acid, Levofloxacin, Tetracycline, Tobramycin, Piperacillin/ Tazobactam, Ceftriaxone, Cefazolin, Ceftazidime, Aztreonam, Ampicillin/ sulbactam.

DISCUSSION

An ear infection, also known as otitis media, is a common condition that occurs when the middle ear becomes inflamed or infected. It can affect people of all ages, but it's more prevalent in children. Ear infections can be caused by viruses or bacteria and often occur after a cold or upper respiratory infection. The aim of this study is to determine the sensitivity of the bacteria, which might help in the treatment, as many of them have developed antibiotic resistance.

In the current study, females (51%) were predominant compared to males (49%). This observation aligns with findings reported by several authors Mansoor T et al. Loy AH et al. Prakash R, Juyal D et al.'s study reported a male prevalence of 46% and a female prevalence of 53.9%.[26,27] However, it contrasts with other studies Paradise JL, Rockette HE, Colborn DK, Bernard BS, Smith CG, Kurs Lasky M, et al. Kumar H, Seth S, Poorey VK show (M:F = 1.4:1).[28,29,30] Given the retrospective nature of this study, the higher incidence of ear infection in women may be incidental. Furthermore, as this was a hospital-based study conducted in a rural area, this demographic context could be a contributing factor.

In our retrospective study analysis, Gram Positive Bacteria (GPB) accounted for 59.7% and Gram Negative Bacteria (GNB) for 40.2% of bacterial ear infections, with Staphylococcus aureus comprising 32.8%, Coagulase-Negative Staphylococci (CONS) 23.1%, Pseudomonas aeruginosa 10.6%, other Pseudomonas species 8.7%, Klebsiella pneumoniae 8.3%, Escherichia coli 5.5%, Methicillin-Resistant Staphylococcus aureus (MRSA) 3.7%, Proteus mirabilis 2.7%, other Proteus species 2.7%, and other Klebsiella species 1.3%. Notable similarities were observed with findings from other studies Poorey and Iyer [30], Muluye D, Wondimeneh Y, Ferede G, Wasihun AG, Zemene Y, Hailegiyorgis TT, Sarhie WD, Workie HM[31,32,33] Additionally, a review article in Sub-Saharan Africa documented analogous bacterial isolates as the etiology of Otitis Media (OM) Tesfa T, Mitiku H, Sisay M, et al[34], The similarities of our findings with those of other studies could be due to a consistent pattern in the microbial profile of bacterial ear infections.

In our retrospective study, *S. aureus* emerged as the predominant bacteria (32.8%), aligning with findings reported by Kumar H, Seth S (37.7%) [29], Prakash et al. (48.69%), Ettehad GH, Refahi S, Nemmati A et al, Brownlee RE, Hulka GF, Prazma J et al, Campos MA, Arias A, Rodriguez C, Dorta A, Betancor L, Lopez-Aguado D, et al, Argaw-Denboba A, Abejew AA et al, Bilkisu IG, Bello AM, Fatima M, et al, and Rangaiah ST, Dudda R, Prasad MH, Kalegowda BN et al][35,36,37,38,39,40,41] *S. aureus* has consistently emerged as the most frequently isolated pathogen from ear infections, as corroborated by various studies conducted by Rangaiah ST, Dudda R, Prasad MH, Kalegowda BN, Sumangala B et al., and Rosenfeld RM, Schwartz SR, Cannon CR, et al.[42,43] While in other countries, *S. aureus* was also found to be the most common isolate, accounting for 43.5% in Taiwan Juen-Haur et al[44] and 34.1% in Norway Dibbs[45].

In this study, antibiotic sensitivity testing was conducted for each isolated organism. It was observed that gram positive isolates such as Staphylococcus aureus, Methicillin-resistant Staphylococcus aureus (MRSA), and Coagulase-negative Staphylococcus (CoNS) exhibited high sensitivity to Vancomycin and Teicoplanin. Additionally, Staphylococcus aureus showed high sensitivity to linezolid and doxycycline. These findings were consistent with those reported by Gupta S, Kumbhat P, Poorey and Iyer [30], Prakash et al [35], Kumar H, and Seth [29].

In our study, we observed that gram negative isolates, including Pseudomonas aeruginosa and other Pseudomonas species, showed sensitivity to Norfloxacin and Doripenem. Additionally, Pseudomonas aeruginosa exhibited sensitivity to piperacillin/tazobactam, imipenem, meropenem, and gentamicin. These findings are consistent with those reported by Gupta S, Kumbhat P, Poorey and Iyer [30], Prakash et al [35], Kumar H, and Seth [29]. It is noteworthy that variations in sensitivity patterns may arise due to differences in antibiotic prescription practices or the prevalence of antibiotic-resistant strains in the healthcare settings where the studies were conducted.

CONCLUSION

This study sheds light on the prevalent gram-positive and gram-negative bacterial strains causing ear infections, notably affecting females and individuals aged 21–30 years in our region. Staphylococcus aureus, CONS, and Pseudomonas aeruginosa emerge as predominant isolates, with sensitivity profiles favoring antibiotics like Vancomycin, Teicoplanin, and Norfloxacin. These findings underscore the importance of tailored empirical therapy protocols, guiding physicians in more effective treatment strategies and informing policymakers in crafting antibiotic prescription guidelines for enhanced patient care.

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